



Science News-Letter

The Weekly Summary of Current Science

A Science Service Publication



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A. A. A. S. Meets to Reveal Progress of Science

Some of the most important papers delivered at the Philadelphia meeting of the American Association for the Advancement of Science, December 27 to January 1, are reported in this issue of the Science News-Letter. Further reports will appear in the next issue.

PHYSICS—ASTRONOMY

Sun Speaks to Earth

The sun and the earth will speak to man and man will understand; the meaning of the messages from the sun that man, in his displeased ignorance, calls static and fading, will be deciphered. These predictions were made by Dr. Michael I. Pupin in his address as retiring president of the American Association for the Advancement of Science at Philadelphia, December 27.

After recounting the half-century of progress in electrical communication that began with Bell's invention of the telephone, Dr. Pupin said:

"The next twenty-five years will not merely see men speaking to men all over the world. The earth itself, and the sun, that great center of all our terrestrial energy, which means all our life, will be speaking to men by means of electrical communications, and men will understand the message. They are speaking now, but as yet we do not understand. We call their voices 'static,' 'fading,' 'earth currents' and other disagreeable terms. The means of electrical communication which the coming generation will develop will be also powerful instruments in their hands for the study of the electrical activity of our solar system; that study will decipher the messages which we now do not understand."

"I myself have already watched on my instruments the arrivals of these cosmic messages," Dr. Pupin continued. "The earth currents in transatlantic cables and the fading of radio messages, for instance, rise and fall, rise and fall, very very slowly, taking hours and hours to complete a cycle. It is like watching the deliberate and irresistible breathing of a cosmic giant. I can only guess that it means a constant, slow, rhythmic change in the

electrical relations between the sun and earth. But where I can only speculate today, the next generation will know."

Shame at not being able to pronounce English as well as a simple steel disc in front of a magnet was a factor in Dr. Pupin's rise from sheep herding in Serbia to the heights of American science. For tonight, Dr. Pupin revealed that at the centennial exposition in 1876, he heard Bell's telephone demonstrated and decided to learn how it executed its magic performance that so far exceeded in perfection the articulation of his speaking organs accustomed to Serbian speech. Today the telephone repeater and telephone cable with inductance coils, thanks largely to Dr. Pupin, make New York, St. Louis and Chicago one large telephonic community.

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MEDICINE

Diabetes Communicable

That diabetes, heretofore considered a disease of disarranged metabolism, is caused by an ultramicroscopic germ or filterable virus is suggested by experiments on rabbits by Dr. D. H. Bergey, professor of hygiene and bacteriology of the University of Pennsylvania.

By infecting rabbits with carefully filtered secretions from diabetic patients, Dr. Bergey was able to produce the first stages of diabetes in the animals. He also found that the infective agent increases in strength when it is cultured in broth, just as well-known visible germs do.

Dr. Bergey calls attention to the astounding doubling of the diabetes death rate in the first twenty-three years of this century and declares that since neither bacterial nor protozoal cause for diabetes mellitus had been discovered, this increase "indicated some definite toxic action and suggested the possibility that a filterable virus might be the responsible agent."

Dr. Bergey found that inoculated rabbits developed the diabetic symp-

toms of sugar in their secretions in one to three weeks and continued to show sugar at irregular intervals, indicating that diabetes had set in.

"The fact that the virus causing diabetes mellitus can be cultivated," he says, "opens up the way for the development of specific prophylactic and therapeutic measures against this disease. Time has not been available to develop this line of investigation but it is hoped that by bringing the results of this preliminary study to the attention of other investigators work in these several fields will be stimulated."

"There is no doubt that systematic study of the blood of normal and inoculated rabbits will aid in the solution of the problem of the etiology (cause) of diabetes and at the same time elucidate the irregularity of the appearance of glucose in the urine of inoculated rabbits."

"More detailed study of the pathology of this infection in rabbits is also needed to determine whether the changes in the pancreas and other internal organs are similar to those in man. For this study, it will be necessary to keep inoculated rabbits under observation for a year or more so as to permit the development of alterations in the pancreas and other internal organs."

"The relation of the form of diabetes in children which is often rapidly fatal to the slowly progressing disease in adults may also be elucidated through experiments on animals."

In diabetes the function of a portion of the pancreas, called the islands of Langerhans, is deficient and does not promote the utilization of the carbohydrate foods eaten. Insulin, a great boon to diabetics, is made from the animal pancreas and substitutes for the normal function of the human gland. Although insulin, the discovery of Banting and Best, has saved the lives of many patients, the cause of diabetes has been unknown.

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GENERAL SCIENCE

A. A. Noyes Heads A.A.A.S.

Prof. A. A. Noyes, director of the Gates Chemical Laboratory, California Institute of Technology, Pasadena, was elected president of the American Association for the Advancement of Science by its council at the closing sessions of the Philadelphia Meeting. Election to this office is one of the highest honors that can be conferred on an American man of Science. Prof. Noyes will preside at the next Christmas meeting and deliver the principal address at the 1928 sessions.

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Mice are deadly enemies of the silkworm.

Cacao beans were used as coins by the Aztecs.

Paper money was made in China 500 years ago.

The poet Virgil thought bees could be produced artificially by a formula.

Radio makes slow progress in India because there are 222 languages and dialects in use there.

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News-Letter Features

Born over four years ago of the demand and interest of those individuals who had caught a glimpse of *Science Service's* news reports to newspapers, the *SCIENCE NEWS-LETTER* has since proved interesting to laymen, scientists, students, teachers and children.

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Photographs aid in the telling of the week's science.

Great care is taken to keep its editorial content not only *interesting* but *accurate* as to fact and implication.

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Scientific Events Make 1926 Notable Year

The year just closed was marked by notable advances in all fields of science and research. Among the highlights of the scientific events were the following:

Aeronautics

Construction of two rigid airships of approximately 6,000,000 cubic foot capacity at cost not over \$8,000,000 for both authorized by Congress but no funds appropriated.

Italian airship Norge demonstrated by North Pole flight technical excellence of semirigid type.

Large Army semirigid airship RS-1 erected in United States.

Great Britain began construction of two rigid airships of not less than 5,000,000 cubic feet capacity, one to be made of duralumin, the other of stainless steel.

Germany began construction of new rigid airship of 3,500,000 cubic feet capacity for transatlantic use.

Construction of first metal-clad airship begun by Aircraft Development Corporation, Detroit, for U. S. Navy.

Airship mooring masts erected at Detroit, Mich., Scott Field, Ill.; Ismailia, Egypt; Karachi, India.

Air commerce act passed by Congress to promote commercial aviation.

Exhaustion of Petrolia, Texas, gas field endangers future supply of helium needed in airship operation.

Rubber lumber, made of hard sponge rubber, replaced wood and supplemented metal as aircraft construction material.

Amphibian airplanes developed for use of Navy, Army and Coast Guard.

Research determined pressure distribution over airship Los Angeles, data that will aid greatly in design of future airships.

Brakes on landing wheels of airplanes were perfected.

Anthropology and Archaeology

Portions of the second Neanderthal skull to be found at Gibraltar were brought to light by Daisy E. Garrod, an English woman.

Discovery of ancient animal bones and relics of early man reported in Czechoslovakia by Dr. Karel Absolon.

Evidences of Neanderthal man were found in Egypt by a British expedition.

Remains of three distinct Indian cultures, one above the other, were found in the Fisher mounds in Illinois by George Langford of Joliet.

A cave home of Paleolithic man, 40,000 years old, was unearthed in Germany near Freiburg, by Dr. Lothar F. Lotz.

A great temple to Chaldean deities was excavated by the joint expedition of the British Museum and the University of Pennsylvania at Ur, the home town of the patriarch Abraham.

Evidence of a highly civilized Indian race of prehistoric times was discovered in the marshy bayou region of southern Louisiana by Henry B. Collins, Jr., ethnologist of the Smithsonian Institution.

Evidence that western Indians maintained complex trade relations with distant tribes was obtained by Herbert W. Krieger, ethnologist of the Smithsonian Institution, who examined graves of prehistoric Indians along the Columbia River.

A great sun dial, built by astronomers

of the Maya race over 1,500 years ago, was discovered at the ruins of the Maya city of Copan, Honduras, by archaeologists of the Carnegie Institution of Washington.

Excavations at the site of the old Philistine stronghold of Beth-Shan, made by the joint expedition of the University of Pennsylvania and the British Museum, shed new light on the history and career of King Saul of the Bible.

Gold and silver art objects of great scientific value, the most important since Schliemann unearthed Mycenae, were dug up in Greece by Swedish archaeologists from the University of Upsala.

A project of setting up the fallen columns of the Parthenon at Athens was undertaken by the Greek government.

The Archaeological Institute of America announced plans to excavate the civic center of ancient Athens, at a cost of millions of dollars.

A chain of 5,700 beads, making a necklace 48 feet long, was found by Dr. A. V. Kidder, anthropologist of the National Research Council at Pecos Pueblo, N.M.

Dr. Manuel Gamio, excavating in Guatemala, found important clues to pre-Maya history.

A temple to the plumed rattlesnake god of the ancient Maya was discovered under a pyramid of a later date in Yucatan, by an expedition from the Carnegie Institution of Washington, which continued its excavations in Maya ruins.

Evidences that the ancient Maya of Yucatan had a great system of well-built stone roads radiating from their metropolis at Coba was discovered by Dr. Sylvanus G. Morley, explorer of the Carnegie Institution of Washington.

Art treasures brought from Turkestan proved the influence of ancient Greek

sculptures on Buddhistic art, according to a report by Dr. Albert von Le Coq, ethnologist of Berlin.

A prehistoric pueblo was excavated near Flagstaff, Arizona, by Dr. J. Walter Fewkes.

A second skull of Pithecanthropus erectus, the ape-man of Java, was reported found but later was judged to be an oddly shaped piece of ancient elephant leg.

Astronomy

Observable region of space was shown by Dr. Edwin Hubble of Mount Wilson Observatory to be a sphere of 140 million light years radius, including some 2,000,000 nebulae, all of them embryo or grown stellar systems.

Mars came closer to earth than it will come again until 1939.

The temperature of the moon was found to be above boiling point when the sun is shining directly on it, by Dr. Donald H. Menzel, of the University of Iowa, as a result of observations at the Lowell Observatory in Arizona.

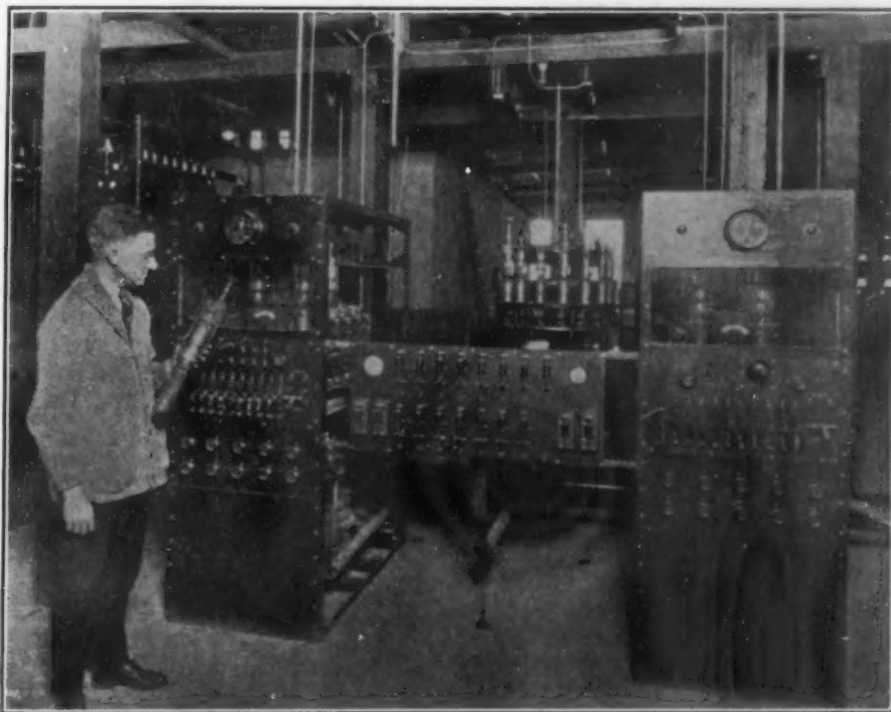
New evidence that our sun is a variable star was obtained by Dr. Charles G. Abbot, of the Smithsonian Institution, by means of a new system he devised for measuring and recording the changes in the energy reaching the earth from the sun.

American astronomical expeditions traveled to Sumatra to observe a total eclipse of the sun on January 14.

Some 125,000 mile long sunspots, largest seen in years were observed by Prof. George H. Peters of the U. S. Naval Observatory in September.

An unusual display of sunspots, the largest being 45,000 miles in diameter and the largest group 150,000 miles long, was ob-

(Just turn the page)



RADIO APPARATUS used in Telephony tests between New York and London

Scientific Events

(Continued from page 3)

served in October. Some of the spots could be seen with the naked eye through smoked glass.

Great increase in sunspot activity was marked on earth by auroral displays and magnetic storms, which caused much disturbance in radio and telegraphic communication.

Eight comets, two of which were new, were discovered during the year. One of the new ones was discovered in January by an amateur astronomer named Blathwayt in South Africa. The second was discovered by Dr. J. Coma-Sola of Fabra Observatory at Barcelona, Spain, in November.

A new star was found in a spiral nebula in the constellation Virgo by Prof. Max Wolf of Heidelberg.

A telescope with a 41-inch lens, to be the largest refractor in the world, was ordered by the Russian government from the Parsons firm in England.

Biology

Dr. James B. Sumner of Cornell Medical College isolated and crystallized the first enzyme, urease.

A "death whisper" consisting of highly intense "beams" of sound-waves too short to be audible, at frequencies as high as 300,000 per second, was shown by Prof. R. W. Wood and A. L. Loomis to be capable of killing certain small animals and plants, and to have other strange biological effects.

The human body grows in three distinct spurts, Dr. Charles B. Davenport, of the Carnegie Institution of Washington, told the National Academy of Sciences.

Eyes of an embryo chicken removed from the egg and planted in a culture medium continued to grow and develop in "a surprisingly normal" way, according to two British physiologists, Dr. H. B. Fell and T. S. P. Strangeways.

The theory that vitamins have opposites, "toxamins," which occur in certain foods and prevent proper bone formation and cause serious nervous diseases, was advanced by Prof. Edward Mellanby, of Sheffield University, in England.

An eleven day old human embryo, the youngest human specimen ever available for observation, was studied and described by Dr. George L. Streeter, embryologist of the Carnegie Institution of Washington.

The mystery of the giant cells in the blood, which are present in tubercular conditions and some other pathological cases, was solved by Dr. W. H. Lewis, of the Carnegie Institution of Washington, who announced that these cells are formed by the fusion of a number of white blood cells.

An international school of fisheries was inaugurated at the University of Washington.

A fly imported from Europe to help save New England shade trees from two insect pests was found to be an enemy to 92 other insects as well.

White pine blister rust, which has for several years been devastating the pine forests of the East, was discovered to be threatening the white pine stands of the West.

New corn-harvesting machinery was invented to combat the spread of the European corn borer.

Individual cells that have lived for as long as two centuries were discovered in Arizona cacti by Dr. D. T. MacDougal.



DR. FRIEDRICH BERGIUS, the German Chemist, who developed a method of turning coal into oil

Plants will respond to strong light if it is flashed on them for as little as one one-thousandth of a second, Dr. F. A. F. C. Went, of Utrecht, demonstrated.

Suction powers in vegetable growth as high as 500 pounds per square inch were demonstrated by Dr. A. Ursprung of the University of Fribourg, Switzerland.

The discovery that plants, as well as animals, have in their cells the special bits of living matter known as the sex chromosomes, was announced by Dr. Kathleen B. Blackburn, British botanist.

The popular idea that big seed are better than small ones was exploded by the experiments of Dr. Felix Kotowski, of the College of Agriculture at Warsaw, who showed that size of seed has no effect on the size of vegetables.

The relationship that plants bear to each other as branches of the evolutionary family tree was demonstrated by means of serum chemistry by Prof. Karl Mez and Dr. H. Zeigenspeck, German botanists.

Luthed Burbank died, April 11.

Plants living for months in hermetically sealed glass bulbs were exhibited to the National Academy of Sciences by Raymond H. Wallace, of Columbia University.

Anti-evolution bills were defeated in Louisiana and Kentucky.

Mississippi enacted an anti-evolution law.

Chemistry

Hydrogen was transmuted into helium by Prof. F. Paneth and Dr. Peters of Berlin University.

Gold was claimed to have been transmuted to mercury by Dr. A. Gaschler, of the Berlin Technical High School.

Nitrogen is changed to fluorine and then to hydrogen and oxygen when hit by the nucleus of an atom of helium, Dr. William

D. Harkins, of the University of Chicago, told the National Academy of Sciences.

Prof. S. B. Hopkins, of the University of Illinois, discovered a new chemical element, No. 61 in the periodic table, and named it illinium.

Elements 75 and 43, reported discovered by Prof. Walter Noddack of Berlin in 1925, have been relegated to the limbo of still undiscovered metals, by experiments at the Platinum Institute of the Russian Academy of Sciences which failed to substantiate the German results.

A synthetic drug called plasmochin, more powerful than quinine, was made in the Elberfelder Farbenfabriken.

Compounds analogous to chaulmoogra oil were made in the laboratory by Dr. Roger Adams of the University of Illinois and were found to act as an effective germicide against leprosy.

The valuable constituent of insulin was prepared in crystalline form by Dr. John J. Abel, of Johns Hopkins University.

The first enzyme, one of an important class of substances involved in digestion to be isolated was made in a crystallized form by Dr. James E. Sumner at Cornell University Medical School.

An extract of the parathyroid gland, which controls the lime content of the blood was prepared successfully from animal glands by A. M. Hjort and H. B. North, Detroit chemists.

Luminous flames radiate more heat than non-luminous flames, according to tests made by Prof. R. T. Haslam and M. W. Boyer, of the Massachusetts Institute of Technology.

A new method of welding pieces of metal together was announced by Dr. Irving Langmuir, of the General Electric Company, by which hydrogen molecules are broken into atoms and recombined to give an intensely hot flame.

Methods for liquefying coal and obtaining motor fuel and other valuable products from coal were perfected by Dr. Friedrich Bergius and Dr. Franz Fischer, both Germany, and General Georges Patart of Paris.

A process for making sugar from wood was developed by Prof. Friedrich Bergius of Heidelberg University.

Tests made by government chemists showed that a thin film of metallic chromium electroplated upon printing plates of finished steel or copper-nickel would make the plates wear longer than plates of hardest steel.

A world famine in rubber by 1930 was predicted by the U. S. Department of Commerce.

Commercial application of carbon dioxide ice for refrigeration purposes has reached the practical stage.

The widespread supplanting of cotton by rayon and similar fabrics made from wood began a revolution in American agriculture.

A project was set on foot to produce levulose sugar in large quantities from the roots of dahlias.

A system of zoning was evolved at the International Conference on Oil Pollution in an attempt to solve the problems arising from the discharge of waste oil by vessels at sea.

To be continued in the next issue of the Science News-Letter, January 8. Engineering and Invention, General Science, Geology and Geography, Medicine, Physics, Psychology, Radio, Seismology and Vulcanology will be covered in the concluding instalment.

New Java Fossil Is Freak

The ancient fossil bone found in Java this summer and reported as a companion of *Pithecanthropus*, the oldest man-like creature known to science, is proved to be a most unusual freak of nature. This conclusion was announced by Dr. Ales Hrdlicka, noted anthropologist of the United States National Museum, following careful study of a photograph just received from Dr. C. E. J. Heberlein, discoverer of the "skull."

Dr. Hrdlicka and Dr. Gerrit Miller, zoologist of the museum, pronounce the Javanese fossil, which has attracted so much attention, to be the leg bone of an ancient elephant, preserved by some remarkable chance, so that it happens to resemble closely the form and size of a prehistoric human skull. In this, the two scientists agree with Prof. Eugene Dubois, in Holland, who has also examined a photograph and considers the specimen an elephant bone.

An additional detail pointed out by Dr. Hrdlicka is that the bone represents a portion of the head of the humerus, the main bone of the fore leg of an elephant. The period in which the prehistoric animal lived is placed by the anthropologist as probably Pliocene, which would be close to a million years ago, by a general estimate.

The clue which revealed the identity of the specimen was the porous looking material beneath the rounded outer surface. In life this was the spongy appearing material within the bone, which enables the bone to withstand stress and weight. A thin layer like this would be found within a skull, but presence of a thick mass convinced the scientists that the fossil relic is the ball-like end of a giant leg bone.

A feature of the American Anthropological Association at Philadelphia was the presentation by Dr. Hrdlicka of an enlarged photograph of the specimen, so that American anthropologists from all over the country could see for themselves details of the much-discussed fossil. Dr. Hrdlicka also had a leg bone of an elephant cut to correspond exactly with the Java specimen, to illustrate the way in which the prehistoric leg came to resemble a skull.

See *Science News-Letter*, October 9, 1926, X, 17; October 16, 1926, X, 35.

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Children in the mountains of Bohemia have taken to skiing as the best means of getting to school in winter.



MAN OR ELEPHANT?—First photograph of the freak fossil to reach this country. Photo received by Dr. Hrdlicka from Dr. Heberlein, of Java.

PHYSIOLOGY

Prenatal Life Favors Girls

Not only is the female of the species more deadly than the male but her chances of survival before birth are better than his. Facts recently brought to light by scientific research indicate that there are circumstances before birth in many animals, including man, which react to the disadvantage of the "stronger" sex.

Dr. Oscar Riddle of the station for experimental evolution of the Carnegie Institution of Washington states that at least one alleged sex-specific hormone passes from the mother's blood into that of her unborn child and exerts an influence antagonistic to masculine development.

In addition to this, says Dr. Riddle, German workers have recently found that there apparently develops in the blood of a mother about to give birth to a boy another substance which has an "anti-male" reaction that can be shown by laboratory tests. When a girl is to be expected no such substance is formed. In consequence this test of the mother's blood indicates the sex of a child before birth.

The German scientists, Dr. Hugo Sellheim of Halle University and his associates, have been working on this aspect of the problem but the technique involved in making the tests has proved thus far too difficult to be of any wide practical use. So prospective parents still have to remain in suspense.

Mere men have an added handicap in their prenatal life in requiring more nourishment than the opposite sex before birth as well as after. In consequence, the chances of a boy's survival with a mother whose nutritional status is not adequate are greatly lessened.

The fact that the prenatal death rate of boys is greater than that of girls need not necessarily indicate that the male sex is weaker, but may be explained by these adverse conditions.

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Evolves Theory of Vitality

In these days when everything is measured, from the energy a man uses up in walking a mile, to the rate at which hairs grow on the head, it scarcely occasions surprise to learn that biologists are boldly setting out to measure vitality.

Dr. Raymond Pearl, director of the Institute for Biological Research at Johns Hopkins University, defines vitality as meaning "the degree of intensity of vital actions."

Taking the ability of fruit flies to resist starvation and the rate of growth of canteloupe seedlings as examples of vital actions, Dr. Pearl has found that the individual differences in "aliveness" involved in both processes in these widely different classes of organisms are practically the same. He has plotted a chart on which curves from the data accumulated through a long series of laboratory experiments showed the substantial identity of the distribution of inherent vitality in such diverse forms of life as an insect and a melon seedling.

"These facts," says Dr. Pearl, "would seem to indicate that in the concept of inherent vitality here developed we are dealing with a matter of real biological importance."

"The direct approach to the study of the action-pattern of organisms opens a vista of entertaining possibilities in biological research. We are busily engaged in my laboratory at the present time in exploring some of these possibilities, and hope to be able to report upon them in the not too far distant future."

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ENTOMOLOGY

Bees Choosy about Colors

Like the proverbial bull, the honeybee is choosy about what colors will excite it, according to Prof. Lloyd M. Bertholf, head of the department of biology of Western Maryland College.

The honeybee is readily stimulated by white and green. It responds less readily to blue, still less to yellow and violet, and hardly at all to red. This was shown by putting several honeybees in a large covered glass dish into which entered two different colored beams of light. In trying to get out of the dish the bees ran to the two spots where the light beams entered. The number of times they bumped into the glass at each spot indicated which light had the stronger effect.

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The oldest living sequoia trees in California are about 4,000 years old.

How to Use Index Feature of News-Letter

In order to aid in catching the items that concern you and to facilitate clipping and filing, a key word in small capitals has been printed on the right of the line above each article. The key words used fit into any system of classification, whether it be a straight alphabetical file, a system of your own devising, the Library of Congress classification or the Dewey system.

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GA Mathematical and astronomical geography.
GB Physical geography.
GC Oceanology and oceanography.
GF Anthropogeography.
GN Anthropology. Somatology. Ethnology. Ethnography. Prehistoric archaeology.
GR Folklore.
GT Manners and customs.
GV Sports and amusements. Games.
HC Economic history and conditions. National production.
HE Transportation and communication.
HF Commerce.
HM Sociology. General.
L Education.
M Music.
N Fine Arts.
P Philology and linguistics.
Q Science. General.
QA Mathematics.
QB Astronomy.
QC Physics.
QD Chemistry.
QE Geology.
QH Natural history.
QK Botany.
QL Zoology.
QM Human anatomy.
QP Physiology.
QR Bacteriology.
R Medicine. General.
S Agriculture. General.
SB Field crops. Horticulture. Landscape gardening. Pests and plant diseases.
SD Forestry.
SF Animal culture. Veterinary medicine.
SH Fish culture and fisheries.

SK Hunting. Game protection.
T Technology. General.
TA Engineering—General.
TC Hydraulic engineering.
TD Sanitary and municipal engineering.
TE Roads and pavements.
TF Railroads.
TG Bridges and roofs.
TH Building construction.
TJ Mechanical engineering.
TK Electrical engineering and industries.
TL Motor vehicles. Cycles. Aeronautics.
TN Mineral industries. Mining and Metallurgy.
TP Chemical technology.
TR Photography.
TS Manufactures.
TT Trade.
TX Domestic science.
U Military science. General.
V Naval science. General.

Dewey Classification

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000 GENERAL WORKS—
010 Bibliography
020 Library economy
030 General cyclopedias
040 General collected essays
050 General periodicals
060 General societies
070 Newspapers
080 Special libraries. Polygraphy
090 Book rarities
100 PHILOSOPHY—
110 Metaphysics
120 Special metaphysical topics
130 Mind and body
140 Philosophical systems
150 Mental faculties. Psychology
160 Logic
170 Ethics
180 Ancient philosophers
190 Modern philosophers
200 RELIGION—
210 Natural theology
220 Bible
230 Doctrinal. Dogmatics. Theology
240 Devotional. Practical
250 Homiletic. Pastoral. Parochial
260 Church. Institutions. Work
270 Religious history
280 Christian churches and sects
290 Ethnic. Non-Christian
300 SOCIOLOGY—
310 Statistics
320 Political science
330 Political economy
340 Law
350 Administration
360 Associations. Institutions
370 Education
380 Commerce. Communication
390 Customs. Costumes. Folklore
400 PHILOLOGY—
410 Comparative
420 English
430 German
440 French
450 Italian
460 Spanish
470 Latin
480 Greek
490 Minor languages
500 NATURAL SCIENCE—
510 Mathematics
520 Astronomy

530 Physics
540 Chemistry
550 Geology
560 Paleontology
570 Biology
580 Botany
590 Zoology
600 USEFUL ARTS—
610 Medicine
620 Engineering
630 Agriculture
640 Domestic economy
650 Communication. Commerce
660 Chemical technology
670 Manufactures
680 Mechanic trades
690 Building
700 FINE ARTS—
710 Landscape gardening
720 Architecture
730 Sculpture
740 Drawing. Decoration. Design
750 Painting
760 Engraving
770 Photography
780 Music
790 Amusements
800 LITERATURE—
810 American
820 English
830 German
840 French
850 Italian
860 Spanish
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880 Greek
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Three-inch Pieces of Light

A method of cutting off three-inch pieces from a beam of light, like a meat cutter slicing a bologna sausage, though the light moves at 186,000 miles a second, is described by Dr. Ernest O. Lawrence and Dr. J. W. Beams of Yale University.

Though light travels so fast that it can encircle the earth seven times in a second, the two physicists made use of a shutter that turned the light on and off with such rapidity that each "piece" of light was only about three inches in length. Each flash lasted a hundred billionth of a second.

The investigation was undertaken in an endeavor to measure the length of what are called "quanta" of light, for according to modern ideas, light is transmitted as separate pulses, each of which is called a quantum. Physicists have been uncertain as to how long these quanta are, but by some it was believed that they were as much as a yard in length.

These extremely short flashes of light were measured by a very delicate photoelectric cell, which gives off an electric current when illuminated, and they found that so long as the total amount of light reaching the cell was the same, the resulting current was not affected by the length of the individual flashes. One three inches long produced an effect as well as a piece of light many miles or more in length, and this shows, say the investigators, that the individual quanta are less than three inches in length.

Science News-Letter, January 1, 1927

GENERAL SCIENCE

Schools Need Trade Journals

A plea that high school libraries allot a larger portion of their funds for scientific reading material to the purchase of trade journal subscriptions is made by Dr. Hanor A. Webb, professor of chemistry at the George Peabody College for Teachers. He believes that trade journals rather than books on applied science should form the bulk of such reading material, especially in schools where vocational guidance is practiced either formally or informally.

The trade journal, he believes, will provide more strictly current information, better descriptions and illustrations of present practices in the use of raw materials, modern equipment, and finally a more human aspect of industry.

Science News-Letter, January 1, 1927

Microscopic Operations

Surgery under the microscope, performed on the minute bits of living tissue of which plants are set together, by means of needles so fine and delicate as to make hairs seem almost like crowbars by comparison, are performed by Prof. Geo. W. Scarth of McGill University, Montreal. Similar operations have been conducted on animal cells in the past. Work on plant cells is somewhat more difficult because of the tough outer coverings in which they are protected, but by pinning his specimens between two, or sometimes three points, Prof. Scarth has been able to manipulate structures within them that are almost invisibly small even under the microscope.

He states that the protoplasm, or fundamental living stuff, is not one substance but several. There is a basic matrix which does not move, and over and around this a layer of more fluid material that is constantly streaming as long as the cell remains alive. Similarly, the nucleus, the lump of special protoplasm that is the center of life in the cell, has a complex structure, for when he punctured its wall part of the contents came out like a fluid while a more solid residue was left behind.

Science News-Letter, January 1, 1927

BIOLOGY—MATHEMATICS

Biology Needs Mathematics

Mathematics, the bugbear of many students, will be as important in biological research during the coming generation as it is now in the so-called "exact sciences" of chemistry and physics, and it will no longer be possible for the scientifically-inclined young man to flee from a study toward which he is disinclined into the biological field. Dr. Horatio B. Williams of Columbia University prophesies that a knowledge of higher mathematics will some day be required of advanced students in the sciences just as a reading knowledge of French and German now are.

However, Dr. Williams holds out some encouragement to the student who believes he has a "non-mathematical" mind. He doubts whether such a mind really exists. It is undoubtedly true, he states, that some students can master mathematics much more easily than others; but with patience and the guidance of the right kind of teachers even they can eventually conquer the subject.

Science News-Letter, January 1, 1927

Brain Hurt Changes Mind

The only known case in which the victim of a serious brain injury has happened to take a psychological test before and after the injury is described by Dr. Rose S. Hardwick, Boston psychologist. The chance happenings in this instance have given scientists an exact record showing the ways in which one individual's mentality was altered by injury to the brain.

The fourteen-year-old boy who was the victim of the accident had been tested psychologically because of difficulties at school. He was pronounced normal in intelligence, and after practical suggestions were given to him and to his parents, he showed marked improvement in school.

Four months later he was seriously injured by a truck. After the damage to the skull and the brain tissues had been repaired as far as possible, and the boy was released from the hospital he was again tested by Dr. Hardwick.

The tests showed that in general the boy has become somewhat slower mentally than before the accident. But where, prior to the accident, one of his mental difficulties had been his carelessness, he is now more accurate in his responses. This is not so true in his use of language, as he now has more trouble in expressing himself clearly and exactly, but where language is not involved, an improvement in accuracy in responding to instructions was evident.

Science News-Letter, January 1, 1927

ANTHROPOLOGY

American Boys Taller

American boys are taller by at least two inches than the youngsters of the same age were when grandpa was a boy. How this change in American stature has been measured is described by Dr. Horace Gray of the Institute for Juvenile Research in Chicago.

Dr. Gray measured over 1,000 boys of American-born parents, between six and eighteen years, and compared their heights with those of boys measured 50 years ago by another scientist. The apparent increasing height of succeeding generations in this country is attributed by Dr. Gray chiefly to the increasing knowledge of health and control of disease. Infantile diseases, which so frequently damage growth, are more under control than in the past, and scientists are rapidly learning facts about the part that vitamins and sunlight play in growth.

Science News-Letter, January 1, 1927

The Problem of Translation—

☛Science, probing the unknown universe, writes its findings in cryptic language. A stellar galaxy shining faintly in the heavens hides its splendor and its immensity in numbers and formulæ; a minute germ has thrust upon it a long Latin name. With the aid of such scientific shorthand and such technicalities, science pushes on to new discoveries and new heights.

☛Yet the facts and the methods of science must penetrate and permeate the whole fabric of civilization if the world is to become an increasingly better place to live in. The man in the street, the child in the school, the merchant in the counting house, the judge on the bench, the priest in the temple, all of those who make the world, must know, appreciate, understand and cherish the spirit of research and the power of thought.

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Eclipse Chief Feature of Coming Astronomical Year

By JAMES STOKLEY

With 1927 comes a period of interesting events for the astronomer, a total eclipse of the sun visible in Great Britain, and the first one to be seen there in two centuries, being the feature act on the celestial program. Two years ago, the thickly settled regions of the northeastern part of the United States had their chance to see one of these rare phenomena. But though the American eclipse was unfavorable, because it occurred in winter, when the sun was low in the sky, early in the morning, and was quite short, the British eclipse, which comes on June 29, is even more unfavorable. The eclipse track, in which the sun is completely obscured by the moon, passes northeastward across Wales and England, through Liverpool, where it occurs at 5.23 a. m. It leaves Britain at Hartlepool, on the east coast, then crosses the North Sea to Norway, where it is a little later in the morning, the sun is higher in the sky and the weather conditions are more favorable. But even there, it only lasts about 40 seconds which is a rather short time to do much observing. After leaving the north coast of Norway, it crosses the Arctic Ocean, north of Novaya Zembla, comes ashore again, crossing the northeastern corner of Siberia, and ending just south of the Aleutian Islands.

Though it is not a good eclipse, as far as eclipses go, many people will travel to points along the eclipse track to watch it as one of the most magnificent spectacles in nature, while scientific observations will also be made. Dr. S. A. Mitchell, of the Leander McCormick Observatory of the University of Virginia, has announced that he will head an expedition to Norway to photograph the flash spectrum. This is caused by the last edge of the sun, seen just before the moon covers it, or the first edge that appears after totality is over. Even with the longest eclipse, it is only a flash, as the name implies, so that for his purposes, the Norway eclipse is as good as any. Many observations will be made in England also, and a party consisting of members of the British Astronomical Association will travel to Aal, in central Norway, where the weather conditions seem to be most favorable.

The solar eclipse is caused by the motion of the moon in its orbit, when it comes between the earth and the sun. When the earth comes between the sun and the moon, there is also

an eclipse, but it is of the moon, and not of the sun. That is because the moon is illuminated solely by sunlight, and when it passes into the earth's shadow it appears dark. Such a phenomenon happens right before the solar eclipse, on June 15, and, unlike the one of the sun, it will be visible in the United States. It will not be seen in Europe, however.

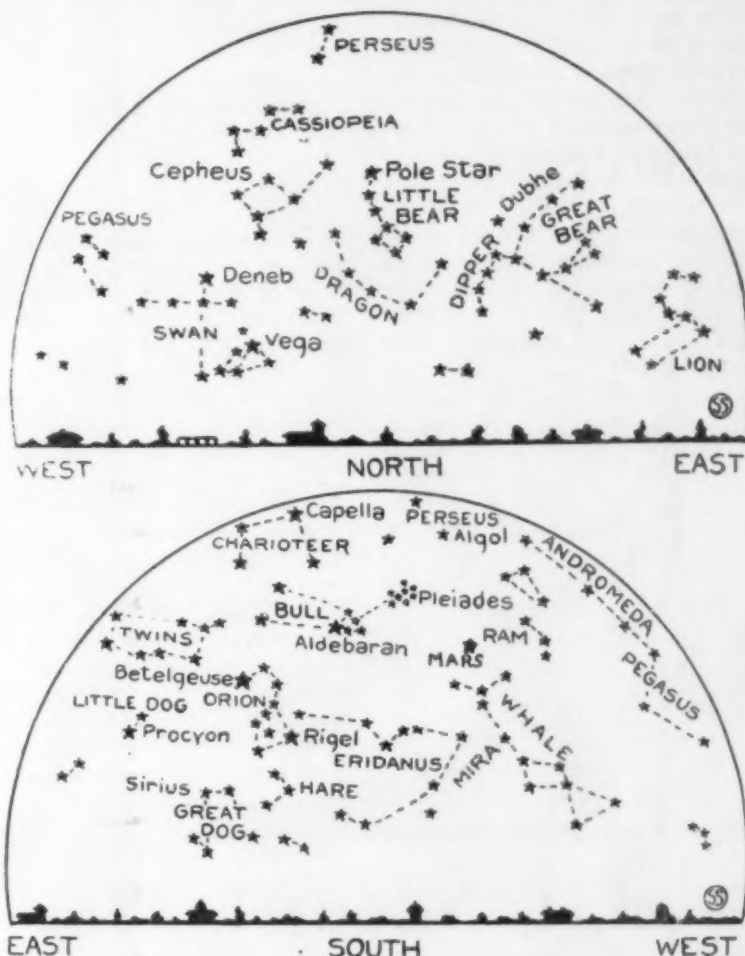
There is another eclipse of the moon, on December 8, which is, however, invisible in the United States; and there are two other eclipses of the sun, neither of which, however, will be of the least scientific value. The first of these is on January 3, and is an annular eclipse. This means that the moon is farther from the earth than ordinarily when it occurs, and so the sun is not completely obscured, but appears as a ring of light around the dark lunar disc. The other solar eclipse is partial and occurs on December 24, but here also the sun will not be completely covered.

Several comets will return to the

neighborhood of the earth during 1927, according to the expectations of astronomers. None of them are apt to become very bright, but one never knows when a new comet is to appear. Some of the brightest comets in history have not been periodic visitors, which return to the earth regularly, but have suddenly appeared out of nowhere, became exceedingly brilliant, and then faded away into the limbo out of which they came. Perhaps (and the perhaps is a very big one) such a comet may arrive this year.

As for the stars visible this month, the winter sky is now visible in all its glory. To the northeast is seen the Big Dipper, which has been below the pole-star for the last few months, and not easily visible. The "Pointers," the familiar pair at the end of the dipper's bowl, which point to the pole star, are almost horizontal. But the southern sky is probably the most interesting. Orion, perhaps the most magnificent of all the constellations, is

(Just turn the page)



Hold the maps in front of you and face north or south. The positions of the stars and visible planets are shown above.

Coming Astronomical Year

(Continued from Page 9)

in a prominent place. This group, which the ancient star maps represented as a warrior with upraised club, defending himself from the bull, nearby Taurus, has many interesting features. Betelgeuse, which has nearly as many different ways of being pronounced as there are astronomers to pronounce it, is the bright north star of the three that form the belt of the warrior, and has the distinction of being the first star to have its diameter measured by means of the interferometer. It is approximately 250,000,000 miles. The great size of this star can be realized if it is recalled that the diameter of the sun is only about 864,000 miles, and the distance of the sun from the earth is only about 93,000,000 miles. The interferometer was invented by Dr. A. A. Michelson, now at the University of Chicago, but was applied to stellar uses by Francis G. Pease, of the Mt. Wilson Observatory, using the great 100-inch telescope of the observatory, the largest in the world.

Another interesting object in the constellation is found in the sword of Orion, a curved row of stars that hangs down from one end of the belt.

A keen eye can see here a faint, hazy patch of light. Through even a small telescope this proves to be a cloud of nebulous material, and the spectroscopic, which analyzes light into a rainbow-like spectrum, shows what it is. A star such as the sun, when examined spectroscopically, shows a band of color crossed by dark lines. This is called an absorption spectrum, and indicates a hot glowing body surrounded by a gaseous shell. But if a glowing gas is examined, there appears a different kind of spectrum, consisting of a series of colored bands or lines. The nebula in Orion shows such a spectrum, which indicates that it is a cloud of glowing gas, and a group of stars at the heart of the nebula probably excite it to incandescence. When an electrical discharge is passed through a tube with a small amount of gas in it, such as helium, the gas glows and gives such a spectrum, so it may be that these stars give off some sort of electrical discharge. Some of the gases thus found in the nebula are known on earth, but one, which gives a green spectrum, has never been identified here. It is called nebulium, but what its properties may prove to be when, and if, it is discovered on the earth, cannot be predicted. However,

helium, now so useful for filling dirigible airships, was first discovered in the sun, during an eclipse, and then was later found on the earth.

The planets are not so well placed this month as they have been during the fall and early winter, for Mars is the only conspicuous one in the evening sky. Jupiter is seen low in the east after sunset. Saturn will be visible just before sunrise, in the eastern sky.

Science News-Letter, January 1, 1927

Yale has made a woman a professor of psychiatric nursing, the first post of this sort to be created.

A novel pair of steel pliers is made for use as a punch, wrench, screw-driver, hammer, wire cutter, and pipe crimper.

The female mourning dove is skillful at luring strangers from her nest by pretending to stagger away with a broken wing.

Since mental clinics were established in Massachusetts, more than 18,000 retarded children have been examined and advice given to their parents.

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BIOLOGY

NATURE RAMBLINGS

By FRANK THONE



Two Yuletide Flowers

There is a very pretty Christmas legend, connected with the story of the Holy Grail; it is better known in England than it is in this country. The story is, that Joseph of Armithea, the friend of Jesus who buried him after the crucifixion, left the Holy Land and went to England, taking with him the cup used at the Last Supper. He stopped at Glastonbury, the tale relates, and thrust his thorny staff into the ground, and the staff there took root and became green. It is still there, at Glastonbury Cathedral, and sometimes at Christmas it bears flowers as red as drops of blood.

There is a plant at Glastonbury, whether Joseph brought it there or not, and there are others like it in many places, that answer this description nicely. It is known technically as *Euphorbia splendens*, or the "splendid Euphorbia," and is related closely to that other well-known Christmas flower, the Poinsettia. Its angular, thorny stem is hardly strong enough to form a staff; but since it is a desert plant a piece of it could be thrust into the ground and caused to strike root and grow after it had been carried about for weeks. It bears few leaves, but its flowers range from coral-pink to a bright blood red.

The poinsettia is a botanical relative of the Christmas thorn. It was first introduced into American cultivation ninety years ago by a gentleman of the Old South, a Doctor Poinsett of Charleston; but it was the more hustling new State of California that was largely instrumental in popularizing this bright tough exotic plant as a Yuletide decoration. Now the poinsettia is found quite as frequently in our holiday windows as is the holly, and its bright flowers flame from our Christmas and New Year cards along with the waxy berries of the mistletoe.

The poinsettia is a botanical paradox. It is not a flower, but rather a red collar around a whole bunch of flowers. The odd little bulbous objects at the center, greenish yellow with perhaps a touch of red here and there on them, are the real flowers,

(Just turn the page)

PSYCHOLOGY

Parents and Personalities

Painfully timid persons and "reds" may alike comfortably lay part of the blame for their personalities upon their parents. The chances are that these characteristics were developed in them at an early age by treatment received at home. The necessity that parents watch their step is stressed by Dr. Phyllis Blanchard, psychologist at the All-Philadelphia Child Guidance Clinic.

The emotions of fear, anger, and love come early in the child's experience and in their modification lies the beginning of character molding. "If some one reaction is continually evoked," she said, "it is likely to crystallize into an habitual reaction and to color the attitude toward other individuals in the wider social group outside the home."

Thus if a child has been given cause a number of times to fear a parent, he will develop a timid, fearful attitude toward the world in general. In the same way, repeated unjust treatment at the hands of his parents will produce in the child a rage reaction that leads him to become suspicious of all mankind. He may become a "red," resistive to all rules and regulations of organized society.

A child that has predominantly experienced love at home will greet the world with confidence and trust, making friends easily. This does not mean, however, that parents should "spare the rod and spoil the child." Love, like fear and anger, can be overdone as a stimulant to personality traits.

The natural imitativeness of children is another cause for care on the part of the parents. Chronic discontent or cheerfulness will be aped with equal readiness.

Science News-Letter, January 1, 1927

ANTHROPOLOGY

Dolls Were Once Gods

The family tree of the modern doll sprouted back in the Stone Age, when cave men carved out the first little rounded image. The doll's ancestry from this beginning is explained by Dr. Walter Hough, curator of anthropology at the National Museum.

Contrary to popular belief, children among primitive peoples are not normally found to have dolls as playthings. This surprising lack of one of the commonest and simplest of toys he explained on the ground the primitive people first made images as religious and magic objects, to be used

by medicine men and sorcerers in their rites.

"An object set apart by some incantation and made to contain more fully the unseen power of the essence of nature is dangerous, not to be seen or touched except by the initiated," says Dr. Hough. "When these ideas are current among lower races, no one would allow a child to possess any image of human or animal form, as such things are forbidden or tabooed under heavy penalty, and the children must amuse themselves in other ways."

As tribes progressed to higher culture some began to look upon images, not as spirit-inhabited fetishes under the control of their possessors, but as beings with higher attributes, more powerful than their creators, who must supplicate and appease them.

The images at this stage come to be regarded as containing or representing the spirit of ancestors, and in the course of time these ancestors become deities. The deities rise, flourish, and decay and others take their place. The cherished deities of former times are thus shorn of their power and the gods at this stage are very near to becoming dolls, for the children to handle with childish disrespect.

In view of this evolutionary background, the "free use of dolls is evidence of the submergence of superstition and an advance to higher culture with the consequent broadening of religious ideas."

Science News-Letter, January 1, 1927

ASTRONOMY

Harvard Observatory Moves

The work of the Boyden Station of the Harvard College Observatory at Arequipa, Peru, established thirty-eight years ago to study stars in the southern hemisphere of the heavens, invisible from northern latitudes, will soon come to an end, when the equipment will be moved to South Africa, according to Dr. Harlow Shapley, director of the observatory.

The new Harvard station will be the third from an American university to be established in South Africa since 1924. Last year, Dr. Frank Schlesinger, of the Yale University Observatory, installed a large telescope at Johannesburg for the measurement of distances of some of the southern stars. A large telescope belonging to the University of Michigan is now being installed at Blomfontein for the study of double stars. Still other American observatories are said to be considering the establishment of South African stations.

Science News-Letter, January 1, 1927

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Pits should be removed from fruit containing stones, before giving it to children.

The first privately owned mooring station for airships has been built at Dearborn, Michigan.

Fish has high food value, but the idea that it is valuable as "brain food" is unfounded in fact.

Strength of egg shells can now be tested for shipping purposes by use of a geared trip hammer.

Before insulin was known as a remedy for diabetes, this disease in children was practically always fatal.

Chromium plated printing plates, used to print labels, have given over a million impressions without showing signs of wear.

A study of dull and backward children in England showed that poor home environment caused backwardness in the largest number of cases.

A recent test indicated that the eyes are more fatigued after 45 minutes of reading than after viewing motion pictures for an hour and a half.

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By C. J. HERRICK, Ph.D., D.Sc.
University of Chicago

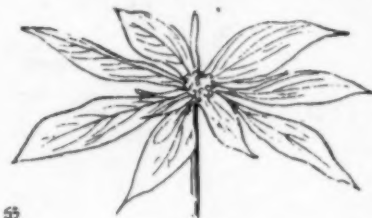
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Nature Ramblings

(Continued from Page 11)



and the bright things we commonly call "petals" are not petals at all but bracts, modified leaves that take the place of petals. In the warmer climates, where this plant grows out of doors they replace the petals not only in the eyes of the human species but also in the eyes of the insects, which are much more important creatures from the point of view of the plant.

Science News-Letter, January 1, 1927

It is claimed that acetylene was discovered when a chemist in disgust threw calcium carbide into a waste jar containing water.

In the middle Atlantic a ton of water contains about 30 pounds of salt; in the Dead Sea the same volume contains about 190 pounds.

Science News-Letter, January 1, 1927

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Science News-Letter, January 1, 1927

COLLOID AND CAPILLARY CHEMISTRY—Herbert Freundlich. Translated by H. Stafford Hatfield—*Dutton*. (\$14). This translation puts into the hands of the English reader the most important work on the most important field of modern chemical research. It is a book following the good old tradition of German thoroughness and comprehensiveness for it contains 883 pages and cites over 1,400 authorities. Freundlich is concerned exclusively with the theory and fundamental laws of colloidal chemistry and only incidentally refers to its numerous applications in industry.

Science News-Letter, January 1, 1927

TREES AND SHRUBS OF MEXICO (BIGNONIACEAE-ASTERACEAE)—P. C. Standley—*U. S. National Herbarium*. Of value to taxonomic botanists.

Science News-Letter, January 1, 1927

THE NEW NATURAL HISTORY—J. Arthur Thomson—*Putnam*.

An admirable work from many points of view. Its exceptionally numerous, well chosen and beautifully reproduced illustrations, and its generally fine get-up are its great eye-catching qualities. Most of the full page color plates are artistically charming and naturalistically life-like and instructive. And the scientific value of all the illustrations is greatly increased by the good description matter added, mostly written, it seems, by Prof. Thomson himself.

But the chief merit of the work is, in the reviewer's opinion, the text itself. Really trustworthy accounts of the activities of animals in nature have never been more needed for educational purposes than right now.

With the growth of ecology and of recognition that psychology must become more and more psychobiological, the demand for reliable information about how animals meet their life problems under natural conditions is growing apace. However, interesting laboratory experiments in comparative psychology may be to professional psy-

chologists for interpreting the animal mind, for those who would know animals' lives, especially to the end of knowing men's lives better, it is clear that whole sectors of the activities of animals must be known which laboratory experimentation can hardly touch. The mating activities of nearly all birds and mammals, for example, are almost wholly out of reach of laboratory or other forms of incarceration technique.

Toward meeting the instructional requirements in these directions such writings as the chapter, "Animal Courtship," in the third volume of *The New Natural History* are exceedingly important. Their value as appraised from this standpoint would, though, be considerably greater were bibliographical references furnished.

It is high time for works on bio-natural history of such quality as the one before us be prized for something more than their esthetic and entertainment values, largely for children; their seriously educational value should be recognized not a whit less for grown-ups than for children.

The increasingly recognized importance of personality studies on human beings is surely leading to increased interest in similar studies on sub-human beings.—*Wm. E. Ritter*.

Science News-Letter, January 1, 1927

BOTANY

Leaves Cure Own Wounds

As first-aid surgeons, the leaves of common green plants have boy scouts or soldiers in battle beaten all hollow. They are constantly being wounded, by being chewed by cattle or caterpillars or other beasts big or small, or by being torn by wind or hail; yet they automatically close up the wound without complaint, effectively keeping out the germs and fungus spores that might start festering diseases, and finally healing over the spot smoothly and permanently. Dr. R. B. Wylie of the State University of Iowa, has studied how leaves "carry on" when they are hurt.

The first thing that happens after a leaf is wounded is the collapse and death of the cells of the tissues surrounding the injury. These frequently enclose air spaces, and they effectually block the "bleeding" of the sap. At the same time the cell-layers making up the upper and lower surfaces curl inwards, and often meet and overlap. If latex or milky juice is present, as it is in lettuce, milkweed and many other plants, it hardens and forms a firm seal over the larger openings.

Gums, resins, slimy secretions and other substances play similar roles. This first aid bandage of plants Dr. Wylie calls the pseudocicatrice.

This is followed by the formation of the cicatrice proper, analogous to the cicatrice that forms in a flesh wound of man or an animal. The development of this more permanent healing tissue seems to be stimulated by some kind of substances released by the crushed cells of the pseudocicatrice. The permanent healing starts leisurely and develops slowly; the initial steps are rarely taken in less than twenty-four hours, and noticeable evidence of its formation may not be found in less than ten days. In general, the cicatrice is formed by the rapid division of cells, closing up the usually loose tissue in the interior of the leaf with a solid barrier of small, thick-walled cells, which later enlarge and develop strengthening layers of cork or woody substance.

Science News-Letter, January 1, 1927

EMBRYOLOGY

Gorilla Young Like Human

In the very early stages of development a young gorilla closely resembles man, Dr. Adolph H. Schultz, of Johns Hopkins University has found, through his study of a young gorilla fetus. This is a rare type of specimen, of which only four have been described.

"At this early stage of development," Dr. Schultz states, "gorilla and man resemble one another much more closely than in adult life, a fact which can only be understood by assuming that both had one common ancestry from which they inherited principally the same plan of growth, a plan which could only have become modified after they evolved in divergent directions."

Science News-Letter, January 1, 1927

GEOLOGY

Sixty-five Giant Springs

To be included in the list of the largest springs in this country a spring must yield at least 65,000,000 gallons of water a day, on the average. The 65 springs that are known to be eligible for the honor have been studied and described by Dr. O. E. Meinzer, of the United States Geological Survey. Any one of these springs turns out enough water to supply a city the size of the national capital. The largest yields almost enough to meet the needs of a city like New York.

Science News-Letter, January 1, 1927

Science Service Books

In cooperation with leading book publishers, Science Service has taken part in editing the following books on science:

- CHATS ON SCIENCE.** By Edwin E. Slosson. New York: The Century Company. 1924. \$2.00.
- SCIENCE REMAKING THE WORLD.** Edited by Otis W. Caldwell and Edwin E. Slosson. New York: Doubleday, Page & Co. 1923. \$2.50 and \$1.00.
- KEEPING UP WITH SCIENCE.** Edited by Edwin E. Slosson. New York: Harcourt, Brace & Co. 1924. \$2.50.
- WHY THE WEATHER?** By C. F. Brooks. New York: Harcourt, Brace & Company. 1924. \$2.00.
- SOIL AND CIVILIZATION.** By Milton Whitney. Library of Modern Sciences. New York: D. Van Nostrand Co. 1925. \$3.00.
- ANIMALS OF LAND AND SEA.** By Austin Clark. Library of Modern Sciences. New York: D. Van Nostrand Co. 1925. \$3.00.
- THE EARTH AND THE STARS.** By C. G. Abbot. Library of Modern Sciences. New York: D. Van Nostrand Co. 1925. \$3.00.
- MYSTERY OF MIND.** By Leonard Troland. Library of Modern Sciences. New York: D. Van Nostrand Co. 1926. \$3.00.
- FOUNDATIONS OF THE UNIVERSE.** By M. Luckiesh. Library of Modern Sciences. New York: D. Van Nostrand Co. 1925. \$3.00.
- CHEMISTRY IN MODERN LIFE.** By Svante Arrhenius, translated and revised by C. S. Leonard. Library of Modern Sciences. New York: D. Van Nostrand Co. 1925. \$3.00.
- CHEMISTRY IN THE WORLD'S WORK.** By H. E. Howe. Library of Modern Sciences. New York: D. Van Nostrand Co. 1926. \$3.00.
- STORIES IN STONE.** By Willis T. Lee. Library of Modern Sciences. New York: D. Van Nostrand Co. 1925. \$3.00.
- EVERYDAY MYSTERIES.** By Charles Greeley Abbot. Young People's Shelf of Science. Edited by E. E. Slosson. New York: The Macmillan Co. 1923. \$2.00.
- DWELLERS OF THE SEA AND SHORE.** By William Crowder. Young People's Shelf of Science. Edited by E. E. Slosson. New York: The Macmillan Co. 1923. \$2.25.

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Anniversaries of Science

January 5, 1769—James Watt obtained the first of his four patents for a steam engine.

When Watt grew up he became an instrument maker at Glasgow University, and it was here that a model of Newcomen's steam pump was brought to him one day for repair. This engine wasted steam in a shocking fashion, for since at every stroke cold water was driven into the cylinder to condense the steam, most of the energy of each fresh inrush of steam was wasted in reheating the cylinder. Watt resolved to find some way of preventing this waste, and for two whole years spent nearly all his spare time in puzzling out the problem As he was taking a walk one fine Sunday in 1765, suddenly, as he says himself, "the whole thing was arranged in my mind." His great idea was to connect to the working cylinder a vessel into which the steam could be exhausted for condensation so that it would be possible to keep the cylinder itself constantly hot.

—T. C. Bridges: *The Young Folks' Book of Invention*.

January 6, 1706—Benjamin Franklin was born in Boston.

That felicity, when I reflected on it, has induced me sometimes to say, that were it offered to my choice, I should have no objection to a repetition of the same life from its beginning, only asking the advantages authors have in a second edition to correct some faults of the first. So I might, besides correcting the faults, change some sinister accidents and events of it for others more favorable. But though this were denied, I should still accept the offer.

—Benjamin Franklin: *Autobiography*.

January 7, 1610—Galileo first saw the satellites of Jupiter, through a telescope of his own construction.

Oh, my dear Kepler, how I wish that we could have one hearty laugh together. Here at Padua, is the principal professor of philosophy whom I have repeatedly and urgently requested to look at the moon and planets through my glass, which he pertinaciously refuses to do. Why are you not here? What shouts of laughter we should have at this glorious folly. And to hear the professor of philosophy at Pisa laboring before the grand duke with logical arguments, as if with magical incantations, to charm the new planets out of the sky.

—Galileo Galilei: Quoted in *Makers of Science* by Ivor B. Hart.

January 8, 1825—Eli Whitney died, inventor of the cotton gin. In twelve years the export of cotton rose from 189,000 pounds to 4,000,000 pounds per annum.

At that time, astonishing as it may seem, the cotton crop of the entire country could have been raised on a field comprising not more than 200 acres. The price of cotton was exceedingly high because of the cost of preparing it for the market. The chief expense was in cleansing it of the dirt, leaves, and the seeds which clung to the

fibres. It appeared unlikely that cotton could ever be raised in large quantities in this country because of the cost of preparing it for the use of the spinner.

One evening Mrs. Greene was entertaining a distinguished gathering of Southern gentry, and the conversation turned to this particular problem.

"Surely, Mr. Whitney can supply your needs," said Mrs. Greene, with confidence in her protegee. Her guests regarded the remark as a pleasantry, but young Whitney took it in all seriousness. Never having seen a cotton-plant, the next day he went into the country and obtained samples of the bolls. Ten days later he had a model of a cotton-cleaning machine.

—Kaempffert: *Popular History of American Invention*.

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GENERAL SCIENCE

Wren Cipher Solved

What appears to be the correct solution for the cipher of Sir Christopher Wren, mentioned in the *SCIENCE NEWS-LETTER* for December 4, 1926, has been furnished by Prof. Bancroft H. Brown, of Dartmouth College. This cipher, which is given in Sir David Brewster's "Memoirs of Life and writings of Sir Isaac Newton" (Edinburgh), was found by him among Sir Isaac's papers. It was said to have been composed by Sir Christopher and presented by him to the Royal Society on November 30, 1714, when he was over eighty years old, and to describe an apparatus for determining longitude at sea. He died, however, before he could give a solution, and, so far as is known, none has ever before been published. The cipher is as follows:

OZVCVAYINIXDNCVOCWEDCN-
MALNABECIRTEWNGRAMHHC-
CAW
ZEIYEINOIEBIVTXESCIOCPSD-
EDMNANHSEEPRIWHDRAEH-
HXCIF
EZKAVEBIMOXRFCSLCEEDH-
WMGN NIVEOMREWWERRCSH-
EPCIP

Prof. Brown's solution is as follows: "Reverse the letters in each paragraph, omit every third letter, the cipher now reads:

WACH MAGNETIC BALANCE
WOVND IN VACVO
FIX HEAD HIPPESS HANDS
POISE TUBE ON EYE
PIPE SCREWE MOVING
WHEELS FROM BEAKE.

"The omitted letters spell:
CHR WREN MDCCXIVZ."

Just what sort of an apparatus Sir Christopher described is not entirely evident, but Prof. Brown makes the following suggestions:

"On the face of it, I should say that the first sentence refers to a chronometer of particular type, while the second and third sentences refer to

a method of obtaining the altitude of a star (possibly the moon, or Jupiter's moons, though there is no clear evidence of either) while at sea. Let me be a little more explicit.

"'WACH MAGNETIC BALANCE WOVD IN VACVO.' 'WACH' is presumably 'watch.' 'MAGNETIC BALANCE' conveys very little to me, possibly it refers to some device for eliminating magnetic disturbances. 'WOVD IN VACVO' apparently means just that, a chronometer in a vacuum, and wound in the vacuum. Perhaps the winding was to take place by means of a magnet.

"'FIX HEAD HIPPESS HANDS POISE TUBE ON EYE—PIPE SCREWE MOVING WHEELS FROM BEAKE.' This, like the preceding, needs careful study by an expert in mechanical terms and usages of the early eighteenth century. It seems to imply something like this: At some elevated in the forepart of the ship (BEAKE means bowsprit, or some elevated point in the forepart of the ship (BEAKE means bowsprit, or some elevated fixed point) a screw enables a wheel to be moved up and down. The observer fixes his head in a definite place, poises a telescope (tube), and observes some star; he signals to his assistant to raise or lower the wheel at the beake until he secures an alignment. He thus obtains (from known measurements on the ship) the altitude of the star. This determination, together with the time, is obviously sufficient to determine longitudes."

The *SCIENCE NEWS-LETTER* will be glad to receive any further suggestions from its readers as to what the apparatus actually was.

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MEDICINE

Hormone a Gland Substitute

The female hormone may soon be on the market for regular medical use. Several biological products' firms are engaged in preparing and standardizing it, according to Prof. Edgar Allen of the University of Missouri. Early results from clinical tests, he declares, indicate that this important substance may be a useful agent in treating many of the disorders that women undergo as a consequence of their function as the reproducers of the human race. The action of the ovarian hormone is fundamentally one of inducing growth in the female genital organs.

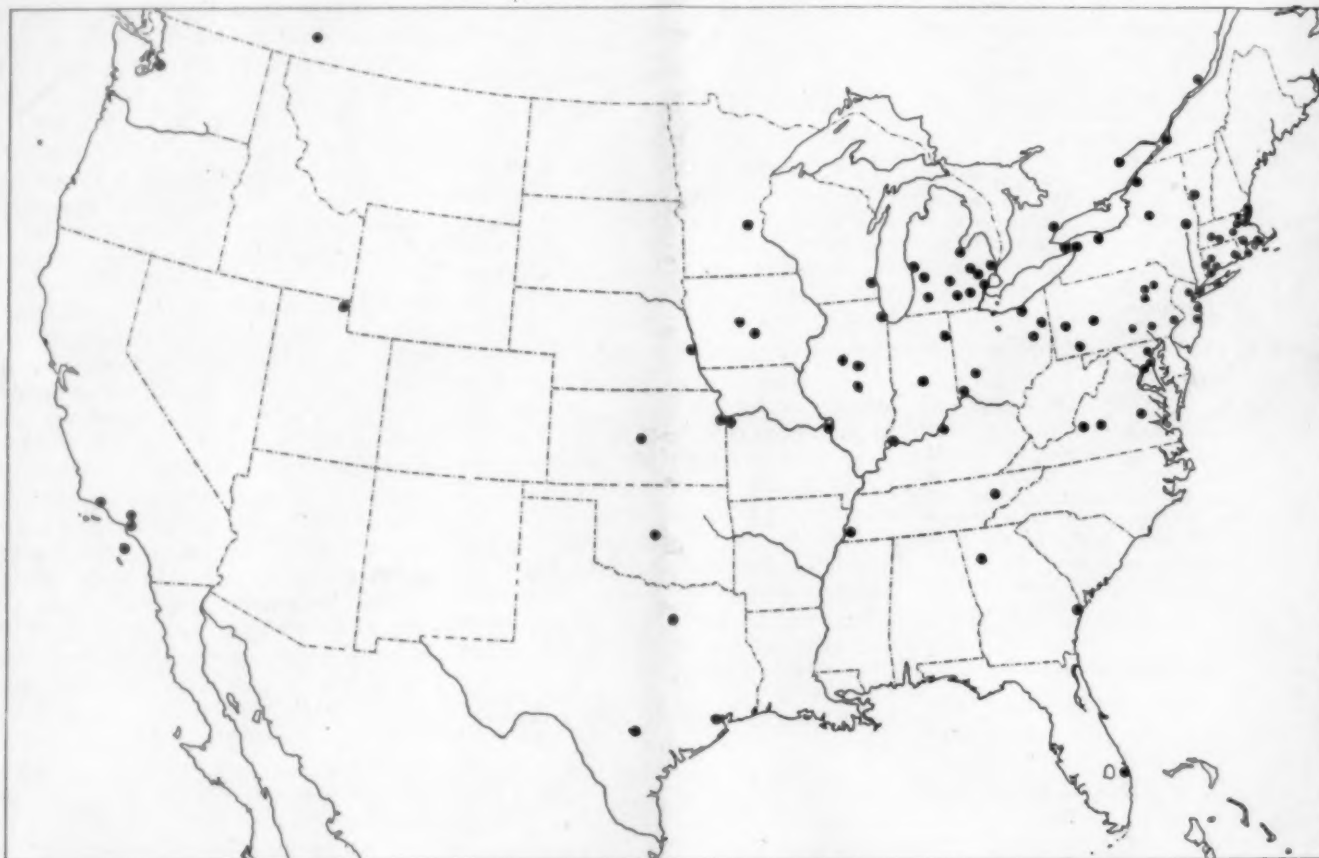
Extracts of the active substance seem to be an adequate substitute for the internal secretions of the ovaries.

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